Waste Minimization/Pollution Prevention Plan

This plan specifies the activities and methods that have been and will continue throughout Ames Laboratory to reduce the volume of wastes generated at the Laboratory.

Comments and questions regarding this plan should be directed to the contact person listed below:

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Environmental Specialist
Address: G40 TASF
Phone: 294-7923

Sign-Off Record:

Approved by: _____ Date: _____
Manager, ESH&A

Approved by: _____ Date: _____
Manager, Purchasing and Property Services

Approved by: _____ Date: _____
Chief Operations Officer

Approved by: _____ Date: _____
Deputy Director

Note: Original Sign-off Record with signatures is on file with ESH&A

Ames Laboratory Integrated Safety Management System

Policy Statement (10200.010 rev 0)

Ames Laboratory has a strong commitment to the safety and health of each Laboratory employee. The Laboratory is equally committed to preventing accidental loss of resources and assets and protecting the general public and the environment, through pollution prevention, property loss or damage to the environment. Therefore, it is our goal to eliminate foreseeable hazards and maintain a safe and healthful workplace through continual improvement. In addition, complying with applicable Laboratory Work Smart Standards, Department of Energy Orders and regulatory standards is a prerequisite for doing Laboratory business and the responsibility of each employee.

In order to accomplish these goals, the Laboratory has incorporated the principles of Integrated Safety Management (ISM) and the practices of an Environmental Management System (EMS) into an Integrated Safety Management System (ISMS). Our Integrated Safety Management System provides mechanisms to ensure that we incorporate safety and environmental management into all aspects of our work, from planning to completion.

Each employee must participate through compliance with the Laboratory's ES&H requirements. Each level of line management has the responsibility to consider the impacts of their activities on the environment and workplace, and to support the performance and continuous improvement of effective safety and environmental practices, such as pollution prevention. This "team" effort is necessary to achieve a safe and productive research laboratory.

Dr. T.J. Barton, Director
Ames Laboratory

1.0 REVISION/REVIEW LOG

The Environmental Specialist is the point of contact for waste minimization and pollution prevention activities at Ames Laboratory. The specialist will review this document every three years. This document was formerly Plan 46400.005.

Revision Number	Effective Date	Contact Person	Pages Affected	Description of Revision
0	10/25/99	D. Kayser	All	Initial
1	10/25/02	D. Kayser	All	Review/Updates
2	01/30/06	D. Kayser	All	G:\Doc&Rec\DCP\Revision Description\ Plan 102_023revdesc.doc

2.0 INTRODUCTION

The Ames Laboratory's Integrated Safety Management System Policy Statement and the Waste Minimization/Pollution Prevention (WMPP) Plan illustrate the commitment of the Ames Laboratory management to reduce waste generation and fully comply with state and federal laws and DOE Orders concerning waste minimization. The Laboratory recognizes the benefits of waste minimization practices, which include conservation of resources and a safe and healthy environment for employees and visitors. Ames Laboratory will explore every option feasible in efforts to preserve these resources and the environment.

The WMPP describes the process and procedures that will be employed by Ames Laboratory to minimize the generation of hazardous, radioactive and sanitary wastes.

3.0 GOALS

This plan documents the Laboratory's support for the following goals:

- Minimize the generation of sanitary, hazardous, radioactive and mixed waste.
- Create and maintain the spirit of Executive Order 13101.
- Instill an environmental culture and awareness in employees to promote pollution prevention in their day-to-day lives.

4.0 RESPONSIBILITIES

4.1 **Director's Office:** Upper management is ultimately responsible for all environment health and safety issues. Upper management will support the Waste Minimization/Pollution Prevention Plan. A line management philosophy is utilized to implement this plan, as many of the activities in this plan are the responsibility of all employees.

4.2 **ESH&A:** ESH&A staff will incorporate waste minimization, pollution prevention and affirmative procurement into training programs and procedures. The staff will monitor and track waste production and minimization efforts and develop new waste minimization/pollution prevention activities when feasible. Staff is responsible for data collection and entry into DOE systems.

4.3 **Purchasing & Property Services:** Purchasing & Property Services staff will provide data to ESH&A on EPA designated items per Executive Order 13101. Purchasing & Property Services is also responsible for securing vendors that supply EPA designated products unless specified in section 5.8 of this document. Staff will also promote the purchasing of environmentally preferable products.

4.4 **Program Directors/Department Managers/Group & Section Leaders:** Program directors, department managers and group and section leaders are responsible for making sure personnel under their supervision are properly trained (i.e. Waste Generators Training, GET), where applicable and that their departments and/or groups are following the guidance of this document.

4.5 **Employees:** It is the responsibility of every employee to reduce, reuse and recycle when possible to do so. Employees are encouraged to contact ESH&A for guidance and support.

5.0 MAJOR PROGRAM ACTIVITIES

5.1 **Source Reduction:**
Source reduction is the primary objective for minimizing hazardous wastes. The substitution of raw materials, inventory control, housekeeping and maintenance are key to reducing waste.

5.2 **Substitution of Raw Materials:**
Whenever possible, non-hazardous materials should be substituted for materials which produce hazardous waste.

5.2.1 **Examples:**

Glassware Cleaning Solutions:
Do not use chromic acid solutions. Instead use a less toxic cleaner (i.e. Alconox® or similar detergents).

Mercury and Mercury Compounds:
Mercury is a toxic metal and very expensive to dispose of. Alternatives for procedures that specify mercury or other toxic metal catalysts should be investigated.

Metals:
Use of certain metals should be avoided because they are difficult and expensive to treat and dispose. Investigate alternatives to using the following metals: antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, silver and titanium.

Halogenated & Non-halogenated Solvents:
Efforts should be made to substitute with a less hazardous solvent. If substitution is not a viable option, the use of non-halogenated solvents is preferable to halogenated solvents due to their lower toxicity. Examples for substitutes are:

- Citric acid-based solutions
- Methyl Soyate
- Simple alcohols and ketones for toluene and xylene
- Xylene and hexane for benzene

Other Substitutions:

Chemical	Substitute	Use
Acetamide	Stearic Acid	Freezing point depression
Benzyol Peroxide	Lauryl Peroxide	Some polymer catalysis
Carbon Tetrachloride	Cyclohexane	Qualitative test for halides
Ethyl Ether	Methyl t-butyl ether	Organic chemistry
Formaldehyde (Formalin)	Ethanol	Specimen storage
Formaldehyde (Formalin)	Formalternate from Flinn Scientific	Specimen storage
Organic Solvent-based inks	Water-based inks	Printing
Peracetic acid	Formaldehyde	Sterilization
Phenol/chloroform extractions	Magic Preps® from Promega Corp. and Lambda DNA Purification Kit from Stratagene	Isolation and purification Of DNA
Sodium dichromate	Sodium hypochlorite	Oxidation reactions
Sulfide ion	Hydroxide ion	Qualitative test for heavy metals

5.3 **Inventory Control:**
The following practices are encouraged to reduce the amount of hazardous waste generated from excess quantities, expired shelf life and spills.

5.3.1 **Chemical Inventory:**
Each Program/Group shall maintain a chemical inventory and update it annually. Chemical inventories are useful in preventing the purchase of chemicals already in stock and in keeping track of shelf life. Chemical purchasing should be coordinated through one person in a research group. An organized inventory also facilitates chemical sharing through research and support groups.

5.4 **Housekeeping and Maintenance:**
Chemical stock should be rotated and expiration dates should be tracked. New containers should be dated when they are received.

Containers should be stored properly to avoid spills and leaks. Keeping containers closed as much as possible should minimize releases to the air through evaporation or fumes. **Fume hoods cannot be used to evaporate waste or to control odors from containers that are not properly sealed**.

Wastes should be segregated as much as possible to facilitate recycling and/or disposal. Keep uncontaminated pump oil separate for recycling. Generators of hazardous waste are required to take Hazardous Waste Generators Training (AL-073). Policies and procedures regarding the collection and storage of hazardous waste, mixed waste and low level radioactive waste can be found in the Ames Laboratory Waste Management Program Manual (Manual 10200.003). The manual can be accessed via the Internet at:
http://www.external.ameslab.gov/esha/ESH&A_Documents/Manuallist.html

5.5 **Process/Procedure Modification:**
When possible experiments should be scaled down and procedures should be reviewed to identify areas for waste minimization.

5.6 **Equipment or Technology Modification:**
Newer generations of automated equipment can result in waste reduction over older, less efficient models.

5.7 **Recycling/Reuse:**
Although source reduction is the preferred method of waste minimization, recycling is important in waste minimization and conserving resources.

5.7.1 **Chemical Redistribution:**

The Environment, Health, Safety & Assurance (ESH&A) office acts as the coordination point for chemical redistribution. In cases where chemicals still have value but are no longer needed by a particular researcher, a list of these chemicals will be e-mailed out to the Laboratory for possible redistribution. These chemicals are offered at no cost.

ESH&A maintains a combined chemical inventory for all research groups at Ames Laboratory. The inventory is updated annually. Researchers in need of a small amount of chemical should contact ESH&A. The chemical inventory database can be used to search for other users of the same chemical. Therefore, researchers are encouraged to share chemicals rather than purchasing new chemicals.

Laboratory personnel are also encouraged to utilize the Department of Energy (DOE) home page for chemicals listed from other DOE facilities or to list equipment and chemicals for redistribution. DOE Material Exchange Web site is http://epic.er.doe.gov/epic. For assistance call ESH&A at 4-2153.

5.7.2 **Metal Recycling:**

Ames Laboratory recycles and/or reuses scrap metal and equipment. Scrap metal is recycled through a scrap metal recycler and equipment is placed in a "pool" to be redistributed. If equipment has been exposed to chemical and/or radiological contaminants contact ESH&A (4-2153) before sending it to be reused or recycled. All types of batteries are also collected and sent off-site to be recycled.

5.7.3 **White Paper:**

White paper recycling containers are placed throughout Ames Laboratory. The white paper is currently picked-up by Iowa State University for recycling.

5.7.4 **Styrofoam Peanuts:**

Employees of the Laboratory are encouraged to separate Styrofoam peanuts from their trash so the peanuts can be reused as packaging material by the Laboratory's materials handling group.

5.7.5 **CRT/Computer Recycling:**

CRT's and other miscellaneous equipment is collected and redistributed through the school exchange program. Equipment that isn't exchanged (obsolete) is sent off-site to be recycled.

5.8 **Affirmative Procurement:**

Affirmative procurement is the conserving of resources through buying recycled content goods. Recognizing that recycling works best if there are markets for the materials collected, Congress directed the Federal government to employ its purchasing power to help create and sustain those markets by buying products manufactured with the collected materials.

The Environmental Protection Agency has designated 62 products in 8 categories that should contain recycled products to be purchased by Ames Laboratory. Designated items that **do not** contain recovered materials may be purchased if it is determined that:

- the price of a given designated item made with recovered materials is unreasonably high
- there is inadequate competition (not enough sources of supply)
- unusual and unreasonable delays would result from obtaining the item, or
- it does not meet the laboratory's reasonable performance specifications.

For a complete list of designated products and content recommendations can be found on the World Wide Web at http://www.epa.gov/cpg/products.htm.

5.9 **Pollution Prevention:**

Ames Laboratory has incorporated many aspects into its operations to prevent pollution. To date these activities include:

- Promoting source reduction by using alternative, less toxic chemicals
- Inventory control
- Good house keeping
- Recycling/Reuse
- Paper Reduction (e-reports)

6.0 REPORTING

The Laboratory is required to report waste minimization, recycling, and affirmative procurement activities to the DOE.

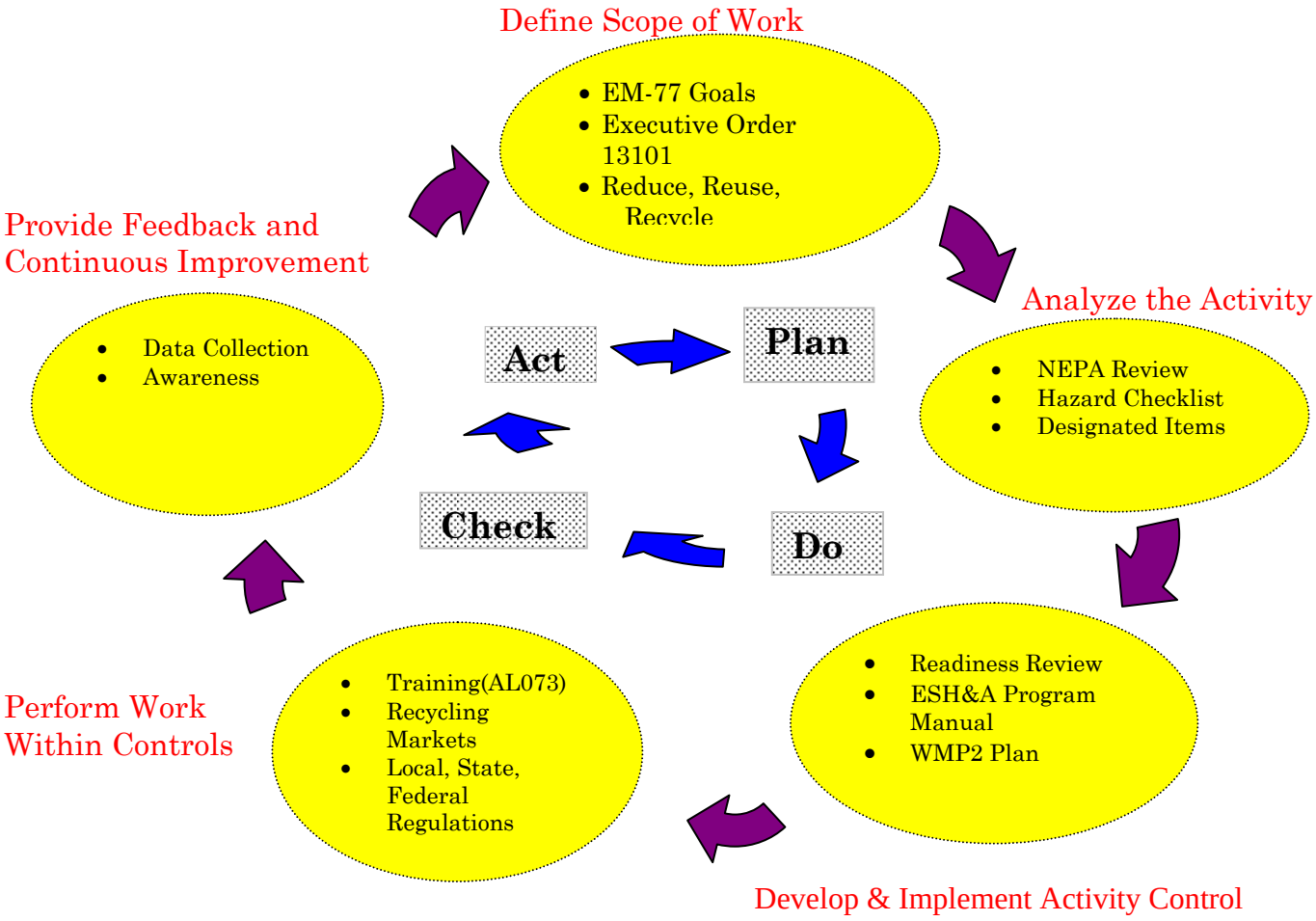
6.1 **Waste Minimization/Pollution Prevention:**

The Office of Pollution Prevention (EM-77) collects data that ESH&A submits, on recycling activities, routine waste, and cleanup/stabilization waste via the internet and publishes the results in the DOE's Annual Report for Waste Generation and Pollution Prevention Progress. Web site address is http://www.eh.doe.gov/p2/dataentry.html.

6.2 **Affirmative Procurement:**
ESH&A submits data via the Internet through the Executive Order 13101 Reporting System. Data regarding recycling, solid waste and affirmative procurement are entered into the system. Web site address is http://www.eh.doe.gov/p2/dataentry.html.

7.0 Plan-Do-Check-Act

The Plan-Do-Check-Act Model is applied to waste minimization/pollution prevention and affirmative procurement at Ames Laboratory as illustrated below.



7.1 **Define Scope of Work:**

7.1.1 **Waste Minimization/Pollution Prevention:**

The Department of Energy, Office of Pollution Prevention EM-77, establishes goals for waste minimization activities. Ames specific goals are set forth in the self-assessment portion of the Iowa State University's contract (W-7405-ENG-82) with the DOE and/or through the Laboratory's Environmental Management System (EMS).

7.1.2 **Affirmative Procurement:**

Executive Order 13101 establishes goals and guidelines to be followed and achieved by federal facilities or facilities using federal monies. By using the Federal government's buying power Congress has mandated that federal facilities or facilities using federal money purchase EPA designated items containing recycled materials. Thus reducing the use of raw materials through recycling and reuse.

7.1.3 **Reduce, Reuse, Recycle:**

Reducing, reusing, and recycling philosophies are incorporated in this document and by following the guidance in this document the Laboratory can accomplish its goals thus reducing the amount of chemicals and raw materials used making the Laboratory a safer and healthier work environment.

7.2 **Analyze the Activity:**

7.2.1 **Waste Minimization/Pollution Prevention:**

All new research activities under go a National Environmental Policy Act (NEPA) review (Procedure 10200.050). The review will determine if the activity will have any significant environmental impacts and if further review is necessary.

7.2.2 **Affirmative Procurement:**

The EPA's Comprehensive Procurement Guidelines (CPG) designates items that must contain recycled content when purchased by Federal agencies or facilities using federal dollars. There are to date 62 products in 8 categories. A complete list can be found at the following web site http://www.epa.gov/cpg/products.htm.

7.3 **Develop & Implement Activity Controls:**

7.3.1 **Waste Minimization/Pollution Prevention:**

Management controls are in place to notify ESH&A staff of activities that may produce waste. These controls are:

- Readiness Review Procedure (Procedure 10200.010)
- ESH&A Program Manual (Manual 10200.002)
- Chemical Requisition Reviews
- Service Order Requisition Reviews

7.3.2 **Affirmative Procurement:**

Purchasing & Property Services reviews, on an as needed basis, orders for products EPA has designated on the recycle content list. Orders are reviewed to verify they meet the requirements for recycled content.

7.4 **Perform Work Within Controls:**

7.4.1 **Waste Minimization/Pollution Prevention:**

Training and education is the foundation to promoting the 3 R's. Ames Laboratory employees are required to take General Employee Training (AL-001), in which employees are introduced to recycling activities at the Laboratory.

Employees that will be generating hazardous waste materials are required to take Hazardous Waste Generator Training (AL-073). The Ames Laboratory Waste Management Program Manual (Manual 10200.003) has been distributed to all Group Leaders for their reference and guidance. Both training and manual have waste minimization/pollution prevention guidance.

The Ames Laboratory storeroom stocks non-mercury thermometers as a means to reducing mercury in the Laboratory.

7.4.2 **Affirmative Procurement:**

The Ames Laboratory storeroom stocks EPA designated items unless it is not feasible due to one of the following reasons stated in section 5.8 of this document. By stocking these items and promoting recycled products the Laboratory will create and maintain the spirit of Executive Order 13101 and develop awareness in employees to promote waste minimization and pollution prevention.

7.5 **Provide Feedback and Continuous Improvement:**

7.5.1 **Waste Minimization Pollution Prevention:**

ESH&A staff tracks waste generated according to Groups and types of waste generated. The database also keeps track of materials that are recycled. Data can be useful in determining trends of waste generation and to notify group leaders of these trends.

Data is submitted to the DOE's Office of Pollution Prevention, EM-77 via the Internet by ESH&A staff. See section 6.1 in this document.

Awareness: ESH&A will send E-mails and put notices in the Ames Laboratory's newsletter, "The Insider", to notify employees of new and existing waste minimization and pollution prevention activities.

7.5.2 **Reporting:**

Quantity and money spent on EPA designated items containing recycled content and items not containing recycled content are tracked buy purchasing & property services. This information is reported (RCRA Executive Order 13101 Report) to DOE via the Internet.

Ames Laboratory materials handling group tracks Styrofoam peanut reuse. White paper volumes are tracked by facility services.

ESH&A staff submits waste generation and pollution prevention efforts to the DOE via the Internet. See section 6.2 in this document.

8.0 REFERENCES & REGULATORY DRIVERS

1) Waste Minimization Program Manual, Iowa State University, 1994.
2) Executive Order 13101, Greening the Government through Waste Prevention, Recycling, and Federal Acquisition.
3) RCRA Section 6002.